CLAIMS

1. A method for producing an RE-containing alloy represented by formula $R(T_{1-x}A_x)_{13-y}$ (wherein R represents at least one species selected from among La, Ce, Pr, Nd, Sm, Eu, Tb, Dy, Ho, Tm, Yb, Gd, and Lu; T represents at least one species selected from among Fe, Co, Ni, Mn, Pt, and Pd; and A represents at least one species selected from among Al, As, Si, Ga, Ge, Mn, Sn, and Sb ($0.05 \leq x \leq 0.2$; and $-1 \leq y \leq 1$)) comprising a melting step of melting alloy raw materials at 1,200 to 1,800°C; and a solidification step of rapidly quenching the molten metal produced through the above step, to thereby form the first RE-containing alloy, wherein the solidification step is performed at a cooling rate of 10^2 to 10^4°C/second, as measured at least within a range of the temperature of the molten metal to 900°C.

2. The method for producing an RE-containing alloy according to claim 1, wherein, in the melting step, the alloy raw material is melted in an inert gas atmosphere at 0.1 to 0.2 MPa.

3. A method for producing the first RE-containing alloy according to claim 1, wherein in the solidification step, the molten metal is rapid-quenched through any of strip casting, new centrifugal casting, and centrifugal casting.

4. A method for producing the RE-containing alloy according to claim 3, wherein the molten metal is rapidly quenched through strip casting in the solidification step, to obtain strips having a thickness of 0.1 to 2.0 mm.

5. A method for producing an RE-containing alloy comprising a melting step and a solidification step for producing the RE-containing alloy according to claim 1, and a heat

treatment step of heating at 900 to 1,200°C the RE-containing alloy that is produced through the solidification step, to thereby form an $NaZn_{13}$ phase.

6. The method for producing an RE-containing alloy according to claim 5, wherein the $NaZn_{13}$ phase is formed through the heat treatment step, which is performed for a period of from one minute to 200 hours.

7. The method for producing the RE-containing alloy according to claim 6, wherein the heat treatment is performed at a temperature of 1080°C to 1200°C and for a period of from 3 to 42 hours.

8. An RE-containing alloy which is obtainable through the method of any one of claims 1 to 4.

9. An RE-containing alloy, which is represented by the formula $R(T_{1-x}A_x)_{13-y}$ (wherein R represents at least one species selected from among La, Ce, Pr, Nd, Sm, Eu, Tb, Dy, Ho, Tm, Yb, Gd, and Lu; T represents at least one species selected from among Fe, Co, Ni, Mn, Pt, and Pd; and A represents at least one species selected from among Al, As, Si, Ga, Ge, Mn, Sn, and Sb ($0.05 \leq x \leq 0.2$; and $-1 \leq y \leq 1$)), and which comprises an R-rich phase, having a relatively high rare earth metal (R) content, and an R-poor phase, having a relatively low rare earth metal (R) content, wherein the R-rich phase and the R-poor phase are dispersed at a phase spacing of 0.01 to 100 μm.

10. An RE-containing alloy, which is represented by the formula $R(T_{1-x}A_x)_{13-y}$ (wherein R represents at least one species selected from among La, Ce, Pr, Nd, Sm, Eu, Tb, Dy, Ho, Tm, Yb, Gd, and Lu; T represents at least one species selected from among Fe, Co, Ni, Mn, Pt, and Pd; and A represents at least one species selected from among Al, As, Si, Ga, Ge,

Mn, Sn, and Sb ($0.05 \leq x \leq 0.2$; and $-1 \leq y \leq 1$)), wherein the alloy has an $NaZn_{13}$ phase content of at least 90 vol.%.

11. A magnetostrictive device provided from the RE-containing alloy according to claim 10.

12. A magnetic refrigerant provided from the RE-containing alloy according to claim 10.

13. An RE-containing alloy, which is represented by a compositional formula of $R_rT_tA_a$ (wherein R represents at least one rare earth element selected from among La, Ce, Pr, Nd, Sm, Eu, Tb, Dy, Ho, Tm, Yb, Gd, and Lu; T collectively represents transition metal elements containing at least Fe atoms, a portion of the Fe atoms being optionally substituted by at least one species selected from among Co, Ni, Mn, Pt, and Pd; A represents at least one element selected from among Al, As, Si, Ga, Ge, Mn, Sn, and Sb; and r, t, and a have the following relationships: 5.0 at.% $\leq r \leq$ 6.8 at.%, 73.8 at.% $\leq t \leq$ 88.7 at.%, and 4.6 at.% $\leq a \leq$ 19.4 at.%) and having an alloy microstructure containing an $NaZn_{13}$-type crystal structure in an amount of at least 85 mass% and α-Fe in an amount of 5-15 mass% inclusive.

14. A method for producing an RE-containing alloy powder, comprising pulverizing, by mechanical means, the RE-containing alloy according to claim 13 to a powder having a mean particle size of 0.1 μm to 1.0 mm.

15. An RE-containing alloy powder comprising an RE-containing alloy according to claim 13, which has a mean particle size of 0.1 μm to 1.0 mm.

16. A magnetic refrigerant comprising the sintered RE-containing alloy powder

according to claim 15, wherein the Curie temperature of the magnetic refrigerant has been controlled through absorption of hydrogen in the sintered RE-containing alloy.

17. A method for producing a sintered RE-containing alloy, which comprises compacting an RE-containing alloy powder produced through a method for producing an RE-containing alloy powder according to claim 14, and sintering the compact.

18. The method for producing a sintered RE-containing alloy according to claim 17, wherein the sintering is performed at 1,200°C to 1,400°C.

19. The method for producing a sintered RE-containing alloy according to claim 17 or 18, wherein, after completion of sintering the RE-containing alloy powder, the sintered alloy is maintained in a hydrogen atmosphere at 200°C to 300°C, to thereby absorb hydrogen into the sintered alloy.

20. A sintered RE-containing alloy, which is formed by compacting the RE-containing alloy powder according to claim 15, and sintering the compact.

21. A magnetostrictive material comprising the sintered RE-containing alloy according to claim 20, wherein the Curie temperature of the magnetostrictive material has been controlled through absorption of hydrogen into the sintered RE-containing alloy.

22. A magnetic refrigerant comprising the sintered RE-containing alloy as recited in claim 20, wherein the Curie temperature of the magnetic refrigerant has been controlled through absorption of hydrogen into the sintered RE-containing alloy.